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ART UNIT	PAPER NUMBER
2168	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/610,961	KEKRE ET AL.	
	Examiner	Art Unit	
	Mahesh H. Dwivedi	2168	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 March 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Receipt of Applicant's Amendment, filed on 03/06/06, is acknowledged.

Information Disclosure Statement

2. The information disclosure statements (IDS) submitted on 3/14/2005, 12/07/2004, 5/19/2004, 2/9/2004, and 10/14/2003 have been received, entered into the record, and considered. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Specification

3. The disclosure is objected to because of the following informalities:

Attorney Docket Number at paragraph 13 should be replaced with the Application serial number and its current status. Appropriate correction is required.

Claim Objections

4. Claim 23 is objected to because of the following informalities: Claim 23 is dependent on a claim not yet stated. Appropriate correction is required.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1, 4-9, 13-15, 18-23, and 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Milillo et al.** (U.S. Patent 6,463,671) and in view of **Goldstein** (U.S. Patent 6,665,815).

7. Regarding claim 1, **Milillo** teaches a method comprising:

A) maintaining first and second data volumes (Milillo, Column 5, lines 56-60), wherein the first data volume is unrelated to the second data volume (Milillo, Column 5, lines 56-60);

B) refreshing the second data volume to data of the first data volume so that the second data volume becomes a point-in-time (PIT) copy of the first data volume,

wherein refreshing the second data volume comprises overwriting all data of the second data volume with data copied from the first data volume (Milillo, Column 7, lines 44-49).

The examiner notes that a "PPRC volume pair" (Column 5, lines 56-60) is analogous to **"first and second data volumes"**. The examiner further notes that it is common knowledge that once a pair is created, they are initially **"unrelated"** to one another.

Milillo does not explicitly teach:

C) preserving data of the second data volume.

Goldstein, however, teaches **"preserving data of the second data volume"** as "a full base state backup" (Column 4, lines 11-15) and "a second succedent backup is created from the second succedent snapshot difference list 123 by examining the snap disk" (Column 4, lines 52-57).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the cited references because teaching **Goldstein's** would have allowed **Milillo's** to provide an effective backup strategy which preserves old versions of the data volume contents at suitable intervals, as noted by **Goldstein** (Column 2, lines 35-38).

Regarding claims 4 and 18, **Milillo** does not explicitly teach a method and a computer readable medium comprising:

Creating one or more PIT copies of the first data volume prior to refreshing the second data volume to the data contents of the first data.

Goldstein, however, teaches **"creating one or more PIT copies of the first data volume prior to refreshing the second data volume to the data contents of the first data volume"** as "first state snapshot", "second state snapshot", "third state snapshot", and "fourth state snapshot" (Column 3, lines 57-67, Column 4, lines 1-10; Figure 3).

The examiner notes that Figure 3 depicts several snapshots of the primary storage system such as S1, S2, and S3 for example.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the cited references because teaching **Goldstein's** would have allowed **Milillo's** to provide an effective backup strategy which preserves old versions of the data volume contents at suitable intervals, as noted by **Goldstein** (Column 2, lines 35-38).

Regarding claims 5 and 19, **Milillo** does not explicitly teach a method and a computer readable medium comprising:

A) wherein one of the PIT copies of the first data volume is in a virtual state when the second data volume is refreshed to the data of the first data volume

Goldstein, however, teaches **"wherein one of the PIT copies of the first data volume is in a virtual state when the second data volume is refreshed to the data of the first data volume"** as "a snapshot is a virtual copy of a disk volume" (Column 3, lines 43-44) and "The snapshots 57 are compared by a processing unit 53, as explained in greater detail below, to produce a list of blocks that have changed between the

snapshots 57 so that these blocks may be copied into backups 59" (Column 3, lines 36-39).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the cited references because teaching **Goldstein's** would have allowed **Milillo's** to provide an effective backup strategy which preserves old versions of the data volume contents at suitable intervals, as noted by **Goldstein** (Column 2, lines 35-38).

Regarding claims 6 and 20, **Milillo** does not explicitly teach a method and a computer readable medium comprising:

A) wherein said preserving comprises creating one or more PIT copies of the second data volume prior to refreshing the second data volume to the data contents of the first data volume (Goldstein, Column 4, lines 11-15, lines 52-57).

Goldstein, however, teaches **"wherein said preserving comprises creating one or more PIT copies of the second data volume prior to refreshing the second data volume to the data contents of the first data volume"** as "a full base state backup" (Column 4, lines 11-15) and "a second succedent backup" (Column 4, lines 52-57).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the cited references because teaching **Goldstein's** would have allowed **Milillo's** to provide an effective backup strategy which

preserves old versions of the data volume contents at suitable intervals, as noted by **Goldstein** (Column 2, lines 35-38).

Regarding claims 7 and 21, **Milillo** does not explicitly teach a method and a computer readable medium comprising:

Wherein one of the PIT copies of the second data volume is in the virtual state when the second data volume is refreshed to the data of the first data volume.

Goldstein, however, teaches **"wherein one of the PIT copies of the second data volume is in the virtual state when the second data volume is refreshed to the data of the first data volume"** as "a snapshot is a virtual copy of a disk volume" (Column 3, lines 43-44).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the cited references because teaching **Goldstein's** would have allowed **Milillo's** to provide an effective backup strategy which preserves old versions of the data volume contents at suitable intervals, as noted by **Goldstein** (Column 2, lines 35-38).

Regarding claims 8 and 22, **Milillo** does not explicitly teach a method and a computer readable medium comprising:

Wherein the first data volume is a real or virtual PIT copy of another data volume when the second data volume is refreshed to the data of the first data volume.

Goldstein, however, teaches **"wherein the first data volume is a real or virtual PIT copy of another data volume when the second data volume is refreshed to the data of the first data volume"** as "a full base state backup is made of the base state snapshot by copying the entire contents of the base state snapshot" (Column 4, lines 11-15) and "second succedent backup" (Column 4, lines 52-57, Figure 6).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the cited references because teaching **Goldstein's** would have allowed **Milillo's** to provide an effective backup strategy which preserves old versions of the data volume contents at suitable intervals, as noted by **Goldstein** (Column 2, lines 35-38).

Regarding claims 9 and 23, **Milillo** does not explicitly teach a method and a computer readable medium comprising:

Wherein the second data volume is a real or virtual PIT copy of another data volume when the second data volume is refreshed to the data of the first data volume.

Goldstein, however, teaches **"wherein the second data volume is a real or virtual PIT copy of another data volume when the second data volume is refreshed to the data of the first data volume"** as "a full base state backup is made of the base state snapshot by copying the entire contents of the base state snapshot" (Column 4, lines 11-15) and "second succedent backup" (Column 4, lines 52-57, Figure 6).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the cited references because teaching **Goldstein's** would have allowed **Milillo's** to provide an effective backup strategy which preserves old versions of the data volume contents at suitable intervals, as noted by **Goldstein** (Column 2, lines 35-38).

Regarding claims 13 and 26, **Milillo** does not explicitly teach a method and a computer readable medium comprising:

A) wherein said preserving comprises creating a PIT copy of the second data volume before or while refreshing the second data volume to the data contents of the first data volume (Goldstein, Column 4, lines 11-15, lines 52-57).

Goldstein, however, teaches **"wherein said preserving comprises creating a PIT copy of the second data volume before or while refreshing the second data volume to the data contents of the first data volume"** as "a full base state backup is made of the base state snapshot by copying the entire contents of the base state snapshot" (Column 4, lines 11-15) and "second succedent backup" (Column 4, lines 52-57, Figure 6).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the cited references because teaching **Goldstein's** would have allowed **Milillo's** to provide an effective backup strategy which preserves old versions of the data volume contents at suitable intervals, as noted by **Goldstein** (Column 2, lines 35-38).

Regarding claims 14 and 27, **Milillo** teaches a method and a computer readable medium comprising:

A) refreshing a data volume of the second hierarchy to the data contents of a data volume of the first hierarchy (Column 7, lines 44-49).

Milillo does not explicitly teach:

B) creating a first hierarchy of data volumes, wherein the first hierarchy comprises a first primary data volume, wherein each data volume in the first hierarchy, other than the first primary data volume is a PIT copy of another data volume in the first hierarchy or a PIT copy of the first primary data volume; and

C) creating a second hierarchy of data volumes, wherein the second hierarchy comprises a second primary data volume, wherein each data volume in the second hierarchy, other than the second primary data volume, is a PIT copy of another data volume in the second hierarchy or a PIT copy of the second primary data volume.

Goldstein, however, teaches **"creating a first hierarchy of data volumes"** and **"creating a second hierarchy of data volumes"** as "first state snapshot", "second state snapshot", "third state snapshot", and "fourth state snapshot" (Column 3, lines 57-67, Column 4, lines 1-10; Figure 3), and **"wherein each data volume in the first hierarchy, other than the first primary data volume is a PIT copy of another data volume in the first hierarchy or a PIT copy of the first primary data volume"** and **"wherein each data volume in the second hierarchy, other than the second primary data volume, is a PIT copy of another data volume in the second**

hierarchy or a PIT copy of the second primary data volume" as "a full base state backup is made of the base state snapshot by copying the entire contents of the base state snapshot" (Column 4, lines 11-15) and "second succedent backup" (Column 4, lines 52-57, Figure 6).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the cited references because teaching **Goldstein's** would have allowed **Milillo's** to provide an effective backup strategy which preserves old versions of the data volume contents at suitable intervals, as noted by **Goldstein** (Column 2, lines 35-38).

Regarding claim 15, **Milillo** teaches a computer readable medium comprising:
A) refreshing a second data volume to the data of a first data volume so that the second data volume becomes a PIT copy of the first data volume (Milillo, Column 7, lines 44-49);
B) wherein refreshing the second data volume comprises overwriting all data of the second data volume with data copied from the first data volume (Milillo, Column 7, lines 44-49); and
C) wherein the first data volume is unrelated to the second data volume prior to refreshing the second data volume to the data of the first data volume (Milillo, Column 5, lines 56-60).

The examiner notes that a "PPRC volume pair" (Column 5, lines 56-60) is analogous to **"first and second data volumes"**. The examiner further notes that it is

common knowledge that once a pair is created, they are initially **"unrelated"** to one another.

Milillo does not explicitly teach:

C) preserving data of the second data volume.

Goldstein, however, teaches **"preserving the data contents of the second data volume"** as "a full base state backup" (Column 4, lines 11-15) and "a second succedent backup is created from the second succedent snapshot difference list 123 by examining the snap disk" (Column 4, lines 52-57).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the cited references because teaching **Goldstein's** would have allowed **Milillo's** to provide an effective backup strategy which preserves old versions of the data volume contents at suitable intervals, as noted by **Goldstein** (Column 2, lines 35-38).

Regarding claims 28 **Milillo** teaches an apparatus comprising:

A) one or more memories for storing data volumes (Column 6, lines 39-40);

B) a circuit for refreshing a data volume of the second hierarchy to the data contents of a data volume of the first hierarchy (Column 7, lines 44-49).

Milillo does not explicitly teach:

C) a circuit for creating a first hierarchy of data volumes and a second hierarchy of data volumes, wherein the first hierarchy comprises a first primary data volume, wherein each data volume in the first hierarchy, other than the first primary data volume, is a PIT

copy of another data volume in the first hierarchy or a PIT copy of the first primary data volume, wherein the second hierarchy comprises a second primary data volume, wherein each data volume in the second hierarchy, other than the second primary data volume, is a PIT copy of another data volume in the second hierarchy or a PIT copy of the second primary data volume;

Goldstein, however, teaches **"creating a first hierarchy of data volumes"** and **"creating a second hierarchy of data volumes"** as "first state snapshot", "second state snapshot", "third state snapshot", and "fourth state snapshot" (Column 3, lines 57-67, Column 4, lines 1-10; Figure 3), and **"wherein each data volume in the first hierarchy, other than the first primary data volume, is a PIT copy of another data volume in the first hierarchy or a PIT copy of the first primary data volume, wherein the second hierarchy comprises a second primary data volume, wherein each data volume in the second hierarchy, other than the second primary data volume, is a PIT copy of another data volume in the second hierarchy or a PIT copy of the second primary data volume"** as "a full base state backup is made of the base state snapshot by copying the entire contents of the base state snapshot" (Column 4, lines 11-15) and "second succedent backup" (Column 4, lines 52-57, Figure 6).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the cited references because teaching **Goldstein's** would have allowed **Milillo's** to provide an effective backup strategy which preserves old versions of the data volume contents at suitable intervals, as noted by **Goldstein** (Column 2, lines 35-38).

8. Claims 2-3, 16-17, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Milillo et al.** (U.S. Patent 6,463,671) and in view of **Goldstein** (U.S. Patent 6,665,815) as applied to claims 1, 4-9, 13-15, 18-23, and 26-28, and in view of **Armangau** (U.S. Patent 6,434,681).

9. Regarding claims 2 and 16, **Milillo** and **Goldstein** do not explicitly teach a method and a computer readable medium comprising:

Modifying data of the first data volume before any or all data of the second data volume is overwritten with data copied from the first data volume.

Armangau, however, teaches **"modifying data of the first data volume before any or all data of the second data volume is overwritten with data copied from the first data volume"** as "After a modification access to a physical storage unit, the primary data storage subsystem 21 inspects the remote copy flag associated with the physical storage unit" (Column 7, lines 49-51) and "If the remote copy flag is set, then the set of primary storage locations cannot be de-allocated until the data in the set of primary storage locations has been copied to the secondary storage 29" (Column 7, lines 58-61).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the cited references because teaching **Goldstein's** and **Armangau's** would have allowed **Milillo's** to provide users services that allow for data to be backed up frequently in order to present the most up-to-date

state of the primary data volume to prevent redundant pit copies, as noted by **Armangau** (Column 2, lines 40-44).

Regarding claims 3 and 17, **Milillo** and **Goldstein** do not explicitly teach a method and a computer readable medium comprising:

Modifying data of the second data volume before any or all data of the second data volume is overwritten with data copied from the first data volume.

Armangau, however, teaches **"modifying data of the second data volume before any or all data of the second data volume is overwritten with data copied from the first data volume"** as "After a modification access to a physical storage unit, the primary data storage subsystem 21 inspects the remote copy flag associated with the physical storage unit" (Column 7, lines 49-51) and "If the remote copy flag is set, then the set of primary storage locations cannot be de-allocated until the data in the set of primary storage locations has been copied to the secondary storage 29" (Column 7, lines 58-61).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the cited references because teaching **Goldstein's** and **Armangau's** would have allowed **Milillo's** to provide users services that allow for data to be backed up frequently in order to present the most up-to-date state of the primary data volume to prevent redundant pit copies, as noted by **Armangau** (Column 2, lines 40-44).

Regarding claim 29, **Milillo** teaches a computer system comprising:

A) one or more memories for storing data volumes (Milillo, Column 6, lines 39-40);

B) a computer system coupled to the one or more memories (Milillo, Column 6, lines 15-17); and

C) a memory for storing instructions executable by the computer system, wherein the computer system implements a method in response to executing the instructions (Milillo, Column 6, lines 15-17), the method comprising:

D) maintaining first and second data volumes in the one or more memories, wherein the first data volume is unrelated to the second data volume (Milillo, Column 5, lines 56-60);

E) refreshing the second data volume to the data contents of the first data volume so that the second data becomes a PIT copy of the first data volume, wherein refreshing the second data volume comprises overwriting all data of the second data volume with data copied from the first data volume (Milillo, Column 7, lines 44-49); and

Milillo does not explicitly teach:

F) preserving data contents of the second data volume.

Goldstein, however, teaches **"preserving data contents of the second data volume"** as "a full base state backup" (Column 4, lines 11-15) and "a second succedent backup is created from the second succedent snapshot difference list 123 by examining the snap disk" (Column 4, lines 52-57).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the cited references because teaching

Goldstein's would have allowed **Milillo's** to provide an effective backup strategy which preserves old versions of the data volume contents at suitable intervals, as noted by **Goldstein** (Column 2, lines 35-38).

Milillo and **Goldstein** do not explicitly teach:

G) modifying data of the first data volume before all data of the second data volume is overwritten with data copied from the first data volume.

Armangau, however, teaches **"modifying data of the first data volume before all data of the second data volume is overwritten with data copied from the first data volume"** as "checking whether or not the storage location of the production data set has been modified since the time when the snapshot copy was created" (Column 2, lines 20-30)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the cited references because teaching **Goldstein's** and **Armangau's** would have allowed **Milillo's** to provide users services that allow for data to be backed up frequently in order to present the most up-to-date state of the primary data volume to prevent redundant pit copies, as noted by **Armangau** (Column 2, lines 40-44).

10. Claims 10-12 and 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Milillo et al.** (U.S. Patent 6,463,671) and in view of Goldstein (U.S. Patent 6,665,815) as applied to claims 1, 4-9, 13-15, 18-23, and 26-28, and in view of **Micka** (U.S. Patent 6,611,901).

11. Regarding claims 10 and 24, **Milillo** and **Goldstein** do not explicitly teach a method and a computer readable medium comprising:

A) generating first and second maps in memory;

B) wherein each of the first and second maps comprises a plurality of entries;

C) wherein each entry of the first map corresponds to a respective memory block that stores data of the first data volume; and

D) wherein each entry of the second map corresponds to a respective memory block that stores data of the second data volume.

Micka, however, teaches **"generating first and second maps in memory"** as "source and target bit maps" (Column 6, lines 22-28), **"wherein each of the first and second maps comprises a plurality of entries"** as "bit map values corresponding to each of the tracks on the source and target devices" (Column 6, lines 22-28; Figures 3a-3b), **"wherein each entry of the first map corresponds to a respective memory block that stores data of the first data volume"** as "bit maps having bit map values corresponding to each of the tracks on the source and target devices" (Column 6, lines 22-28; Figures 3a-3b), and **"wherein each entry of the second map corresponds to a respective memory block that stores data of the second data volume"** as "bit maps having bit map values corresponding to each of the tracks on the source and target devices" (Column 6, lines 22-28; Figures 3a-3b).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the cited references because teaching

Goldstein's and **Micka's** would have allowed **Milillo's** to provide improved point-in-time copy methods, as noted by **Micka** (Column 2, lines 27-30).

Regarding claim 11, **Milillo** and **Goldstein** do not explicitly teach a method comprising:

A) setting a first bit in each entry of the first map, wherein each first bit of the first map is set to indicate its respective memory block stores valid data; and

B) clearing a first bit in each entry of the second map, wherein each first bit of the second map is set to indicate its respective memory block stores invalid data.

Micka, however, teaches **"setting a first bit in each entry of the first map, wherein each first bit of the first map is set to indicate its respective memory block stores valid data"** as "a one or "on" value indicates that the point-in-time copy is on the source track" (Column 6, lines 22-28; Figures 3a-3b), and **"clearing a first bit in each entry of the second map, wherein each first bit of the second map is set to indicate its respective memory block stores invalid data"** as "a zero indicates that the point-in-time copy has been copied from the source track location to the target" (Column 6, lines 22-28; Figures 3a-3b).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the cited references because teaching **Goldstein's** and **Micka's** would have allowed **Milillo's** to provide improved point-in-time copy methods, as noted by **Micka** (Column 2, lines 27-30).

Regarding claim 12, **Milillo** and **Goldstein** do not explicitly teach a method comprising:

Setting or clearing a second bit in each entry of the second map to indicate that its respective memory block stores data needed for a PIT copy of the second data volume.

Micka, however, teaches **"setting or clearing a second bit in each entry of the second map to indicate that its respective memory block stores data needed for a PIT copy of the second data volume"** as "a one or "on" value indicates that the point-in-time copy is on the source track" (Column 6, lines 22-28; Figures 3a-3b) and "a zero indicates that the point-in-time copy has been copied from the source track location to the target" (Column 6, lines 22-28; Figures 3a-3b).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the cited references because teaching **Goldstein's** and **Micka's** would have allowed **Milillo's** to provide improved point-in-time copy methods, as noted by **Micka** (Column 2, lines 27-30).

Regarding claim 25, **Milillo** and **Goldstein** do not explicitly teach a computer readable medium comprising:

A) clearing a first bit in each entry of the first map, wherein each first bit of the first map is set to indicate its respective memory block stores valid data; and

B) setting a first bit in each entry of the second map, wherein each first bit of the second map is set to indicate its respective memory block stores invalid data.

Micka, however, teaches **"clearing a first bit in each entry of- the first map, wherein each first bit of the first map is set to indicate its respective memory block stores valid data"** as "a zero indicates that the point-in-time copy has been copied from the source track location to the target" (Column 6, lines 22-28; Figures 3a-3b), and **"setting a first bit in each entry of the second map, wherein each first bit of the second map is set to indicate its respective memory block stores invalid data"** as "a one or "on" value indicates that the point-in-time copy is on the source track" (Column 6, lines 22-28; Figures 3a-3b).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the cited references because teaching **Goldstein's** and **Micka's** would have allowed **Milillo's** to provide improved point-in-time copy methods, as noted by **Micka** (Column 2, lines 27-30).

Response to Arguments

12. Applicant's arguments filed on 03/06/06 have been fully considered but they are not persuasive. Applicant suggests on page 10, that **"Applicants respectfully submit that the amended "maintaining" claim language requires that the first and second data volumes initially have no logical relationship. Since a PPRC volume pair is configured to have a logical relationship, as disclosed by Milillo, then Milillo does not disclose the amended claim language"**. However, the examiner wishes to point to Column 5 and refer to the eighth paragraph, which states that **"In a PPRC system,**

volume pairs are designated in which a storage volume in the primary system is paired with a storage volume in the secondary system which together may be referred to as an established PPRC volume pair" (Column 5, lines 56-60). The examiner wishes to state that in order to establish a PPRC volume pair, each volume must be unrelated initially in order to create the PPRC pair.

Applicant then goes on to argue on page 10, that **"Thus, the secondary storage system of a PPRC volume pair, which is co-related to the claimed second data volume by the Office Action, is not (a) refreshed with the data contents of the primary storage system, nor (b) are the contents of the secondary storage system overwritten with data copied from the primary storage system, both as required to anticipate Claims 1 and 15"**. However, the examiner wishes to point to Column 7 and refer to the third paragraph which states that "copying all of the data of source volume 52 to primary volume 54, which data is then migrated to corresponding secondary volume 56" (Column 7, lines 44-49). The examiner wishes to state that according to the claimed language, "copying all of the data of source volume 52 to primary volume 54, which data is then migrated to corresponding secondary volume 56" (Column 7, lines 44-49) is analogous to **"refreshing the second data volume to data of the first data volume so that the second data volume becomes a point-in-time (PIT) copy of the first data volume, wherein refreshing the second data volume comprises overwriting all data of the second data volume with data copied from the first data volume"**, since all of the primary content of the primary volume is migrated to the

secondary volume, and as a result, the secondary volume becomes a snapshot of the primary volume.

Applicant then goes on to argue on page 13, that **"Such disclosure is not disclosure of limitations 2, 3, 16, 17, and 29, which deal with data modification of a first data volume or second data volume before writing the data to the second data volume"**. However, the examiner wishes to point to Column 7 and refer to the third paragraph, which states that ""After a modification access to a physical storage unit, the primary data storage subsystem 21 inspects the remote copy flag associated with the physical storage unit" (Column 7, lines 49-51) and "If the remote copy flag is set, then the set of primary storage locations cannot be de-allocated until the data in the set of primary storage locations has been copied to the secondary storage 29" (Column 7, lines 58-61). The examiner wishes to state that the process of **Armangau** clearly shows that after modifying the primary system, the system checks a flag, and then copies the content of that flag into the secondary storage system dependant on the type of flag encountered.

Applicant then goes on to argue on page 14, that **"Thus, a person of ordinary skill in the art would not be motivated to combine the teachings of Armangau with Mililllo"**. However, the examiner wishes state that **Mililllo** does not explicitly teach the limitation of modifying a primary storage system before copying it to a secondary storage system. As a result, using **Armangau's** teaching would have allowed **Mililllo** to refrain from having continuous redundant pit copies from the primary volume to the secondary volume.

Applicant then goes on to argue on page 15, that **"The Office Action provides no clear instruction as to what structures disclosed within Goldstein correspond to the first and second data volumes of the claims"**. However, the examiner wishes to point to Figure 1, and state that "offline storage 40" is analogous to a secondary storage system" and "disk storage 30" is analogous to a "primary storage". The examiner further wishes to state that **Goldstein's** system creates multiple pit copies of the disk storage system 30 and transfers those copies to offline storage 40.

Applicant then goes on to argue on page 16, that **"The cited section provides no mention of a second data volume being refreshed with contents of a first data volume"**. However, the examiner wishes to point to column 4 and refer to the fifth paragraph which states that "A second succedent backup (B12) is created from the second succedent snapshot difference list" (Column 4, lines 54-55). The examiner further wishes to state that **Goldstein's** method teaches multiple base snapshots which replace the previous snapshots and thus, overwrite the previous snapshots.

Applicant then goes on to argue on page 16, that **"However, this is not a disclosure of refreshing a second data volume with the contents of a first data volume as required by the claim"**. However, the examiner wishes to point to column 3 and refer to the eleventh paragraph which states that "The snapshots 57 are compared by a processing unit 53, as explained in greater detail below, to produce a list of blocks that have changed between the snapshots 57 so that these blocks may be copied into backups 59" (Column 3, lines 36-39). The examiner further wishes to state that copying into a backup is analogous to refreshing it.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent 6,799,258 issued to **Linde** on 28 September 2004. The subject matter disclosed therein is pertinent to that of claims 1-29(e.g., methods to create PIT copies of data volumes).

U.S. Patent 5,875,479 issued to **Blount et al.** on 23 February 1999. The subject matter disclosed therein is pertinent to that of claims 1-29 (e.g., methods to perform PIT copies of data volumes).

U.S. Patent 6,338,114 issued to **Paulson et al.** on 8 January 2002. The subject matter disclosed therein is pertinent to that of claims 1-29 (e.g., methods to manipulate multiple data volumes).

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mahesh Dwivedi whose telephone number is (571) 272-2731. The examiner can normally be reached on Monday to Friday 8:20 am – 4:40 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Vo can be reached (571) 272-3642. The fax number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mahesh Dwivedi

Patent Examiner

Art Unit 2168

May 26, 2006

Leslie Wong

Primary Examiner